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This programed mathematics textbook is for student use in vocational education courses. It was developed as part of a programed series covering 21 mathematical competencies which were identified by university researchers through task analysis of several occupational clusters. The development of a sequential content structure was also based on these mathematics competencies. After completion of this program the student should be able to add and subtract decimal numbers to other decimal numbers and to integers. The material is to be used by individual students under teacher supervision. Twenty-six other programed texts and an introductory volume are available as VT 006 882-VT 006 909, and VT 006 975. (EM)

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Occupational Mathematics

ADDITION AND SUBTRACTION OF DECIMALS

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Occupational Mathematics

ADDITION AND SUBTRACTION OF DECIMALS

Project No. OE7-0031
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Report No. 16-J

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June 1968

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Washington State University, Department of Education, Pullman, Washington
State Coordinating Council for Occupational Education, Olympia, Washington

OBJECTIVES

1. The student should be able to add decimal numbers to one another, or add them to integers.

2. The student should be able to find the difference between any two decimal numbers, or between a decimal number and an integer.

Greetings! You are about to begin improving your knowledge of basic mathematics. There are many important uses for the mathematics you are learning.

This booklet is not like your ordinary books. It is designed to help you learn as an individual. On the following pages you will find some information about mathematics. After the information is presented, you will be asked a question. Your answers to these questions will determine how you proceed through this booklet. When you have selected your answer to the question, turn to the page you are told to.

Do not write in this booklet. You may wish to have a pencil and some paper handy so you can write when you want to.

Remember this is not an ordinary book.

1. Study the material on the page.
2. Read the question on the page (you may want to restudy the material on the page).
3. Select the answer you believe is correct.
4. Turn to the page indicated by your answer.

Are you ready to begin?

(a) Yes — Turn to page 1

(b) No — Turn to page C

(c) HELP — Go see your teacher

Your answer was (b) No.

Well, this booklet is a little different.

Go back and read page B again. After you have read it, you will probably be ready to begin.

HELLO!

In this unit you will learn how to add and subtract numbers involving decimals. The procedures for adding and subtracting decimals are similar to those of adding and subtracting integers. There are two important differences you should notice. They are:

1. The decimal point must be properly located before the addition or subtraction is performed.
2. The decimal point in the answer must be correctly located.

Let's start with the following example:

By adding the numbers:
$$\begin{array}{r} 2.02 \\ 4.21 \\ .75 \\ \hline 6.98 \end{array}$$
We obtain the answer:

(Continue on next page)

The actual addition was exactly the same as if integers were being added. The important thing to notice is that <u>all</u> the decimal points are lined up in a vertical column so that each is directly above or below the others.

Now you try one.

Add: 3.12
1.23
<u>.04</u>

(a) 4.40 Turn to page 7

(b) .439 Turn to page 3

(c) 4.39 Turn to page 5

No! You seem to be missing the point.

Ask your teacher for help in placing the decimal point in the answer of addition problems.

Then return to page 1 of this Unit.

Incorrect!

You were asked to add the following numbers:

$$\begin{array}{r} 3.12 \\ 1.23 \\ .04 \\ \hline \end{array}$$

All you needed to do was correctly add the numbers, which you did, and then properly locate the decimal. This latter part shouldn't have caused you trouble. When the decimals are lined up in a column, like in this problem, then all that is necessary is to locate the decimal point in the answer directly below the others. Thus,

$$\begin{array}{r} 3.12 \\ 1.23 \\ .04 \\ \hline 4.39 \end{array}$$

Note that the decimal points lie directly below one another.

(Continue on next page)

Try another one.

Add: 1.22
2.42
.05

(a) 36.9 Turn to page 9

(b) 3.69 Turn to page 6

(c) .369 Turn to page 11

¡No! You seem to be missing the point.

Ask your teacher for help in placing the decimal point in the answer of addition problems.

Then return to page 1 of this Unit.

Correct!

You can successfully add decimals which are in proper order, but what about subtraction?

Question:

Subtract: 127.84
- 16.02

(a) 111.82 Turn to page 8

(b) 11.82 Turn to page 13

(c) 1182 Turn to page 15

Yes, the correct sum is 3.69.

Try this one.

Add: 2.11
.15
2.13

(a) .439 Turn to page 10

(b) 4.39 Turn to page 5

(c) 43.9 Turn to page 12

Wait a minute! The sum of 3.12, 1.23, .04 is <u>not</u> equal to 4.40.

You have made a mistake in addition.

Return to page 1 and add the numbers again.

Good, the answer you chose is correct.

Try this one.

Add: 174.51
68.09
4.31
.21

(a) 246.112 Turn to page 29

(b) 247.12 Turn to page 26

(c) 246.12 Turn to page 33

Incorrect! Let's look at the problem again.

We want to add:
$$\begin{array}{r} 1.22 \\ 2.42 \\ .05 \\ \hline \end{array}$$

The decimal points are lined up, so all we have to do is add the columns and bring the decimal point straight down. Our problem will look like this:

$$\begin{array}{r} 1.22 \\ 2.42 \\ .05 \\ \hline 3.69 \end{array}$$

Now, try this one.

Add:
$$\begin{array}{r} 1.01 \\ 1.57 \\ 1.11 \\ \hline \end{array}$$

(a) .369 Turn to page 2

(b) 36.9 Turn to page 4

(c) 3.69 Turn to page 6

No, you did it again. Doggone, I thought you had it. Let's look at the problem again. We are adding the numbers:

$$\begin{array}{r} 2.11 \\ .15 \\ \underline{2.13} \end{array}$$

First we add the columns one at a time starting on the right. Doing this we get 439. Second, we bring the decimal point down so that it is directly below the others. Having done this we obtain 4.39 which is the correct answer.

Look at the example again. Now try this one.

Add:

$$\begin{array}{r} .45 \\ .12 \\ \underline{.41} \end{array}$$

(a) .98 Turn to page 14

(b) 9.8 Turn to page 4

(c) 98. Turn to page 2

Incorrect! Let's look at the problem again.

We wanted to add:
$$\begin{array}{r} 1.22 \\ 2.42 \\ .05 \\ \hline \end{array}$$

The decimal points are lined up, so all we have to do is add the columns and bring the decimal points straight down. Our problem will look like this:

$$\begin{array}{r} 1.22 \\ 2.42 \\ .05 \\ \hline 3.69 \end{array}$$

Now, try this one.

Add:
$$\begin{array}{r} 1.01 \\ 1.57 \\ 1.11 \\ \hline \end{array}$$

(a) .369 Turn to page 2

(b) 36.9 Turn to page 4

(c) 3.69 Turn to page 6

No, you did it again. Doggone, I thought you had it!

Let's look at the problem again. We are adding the numbers:

$$\begin{array}{r} 2.11 \\ .15 \\ \underline{2.13} \end{array}$$

First, we add the columns one at a time starting on the right. Doing this we get 439. Second, we bring the decimal point down so that it is directly below the others. Having done this we obtain 4.39 which is the correct answer.

Look at the example again. Now, try this one.

Add:

$$\begin{array}{r} .45 \\ .12 \\ \underline{.41} \end{array}$$

(a) .98 Turn to page 14

(b) 9.8 Turn to page 4

(c) 98. Turn to page 2

No, not quite!

Let's look at the problem again. We wanted to

subtract:
$$\begin{array}{r} 127.84 \\ -\ 16.02 \\ \hline \end{array}$$

In subtraction we follow the same procedure as with addition. First, we subtract the two quantities. Then the decimal point is brought directly down below the others. Following this procedure you should have

obtained:
$$\begin{array}{r} 127.84 \\ -\ 16.02 \\ \hline 111.82 \end{array}$$

Perform the following subtraction:
$$\begin{array}{r} 8.954 \\ -\ .942 \\ \hline \end{array}$$

(a) 8.012 Turn to page 16

(b) 8.12 Turn to page 21

(c) .8012 Turn to page 23

Good! .98 is the correct answer.

Try one more.

What is the sum of:

$$\begin{array}{r} 60.15 \\ 23.01 \\ 15.41 \\ \underline{\ 1.02} \end{array}$$

(a) 9.969 Turn to page 2

(b) 98.6 Turn to page 17

(c) 99.59 Turn to page 5

No, not quite!

Let's look at the problem again. We wanted to subtract:

$$\begin{array}{r} 127.84 \\ -\ 16.02 \\ \hline \end{array}$$

In subtraction we follow the same procedure as with addition. First, we subtract the two quantities. Then, the decimal point is brought directly down below the others. Following this procedure you should have obtained:

$$\begin{array}{r} 127.84 \\ -\ 16.02 \\ \hline 111.82 \end{array}$$

Perform the following subtraction:

$$\begin{array}{r} 8.954 \\ -\ .942 \\ \hline \end{array}$$

(a) 8.012 Turn to page 16

(b) 8.12 Turn to page 21

(c) .8012 Turn to page 23

Very good! Your answer is correct.

Try this one.

Subtract: 284.93
-173.11

(a) 11.192 Turn to page 24

(b) 11.182 Turn to page 19

(c) 111.82 Turn to page 8

No, your answer is wrong!

You seem to be going around in circles. You get some right and then some wrong.

Return to page 1 and be more careful this time.

Incorrect!

Tell your teacher that you are having trouble subtracting decimals and need help. Then, return to page 5 of this Unit.

Incorrect! Let's examine the problem.

The problem was to subtract 173.11 from 284.93.

The problem looks like this:
$$\begin{array}{r} 284.93 \\ -173.11 \\ \hline 111.82 \end{array}$$

Study this example with emphasis on where the decimal point lies.

Question:

What is the difference between:
$$\begin{array}{r} 87.39201 \\ -\ 7.25101 \\ \hline \end{array}$$

(a) 80.141 Turn to page 22

(b) 8.1410 Turn to page 25

(c) 80.14100 Turn to page 20

Good! Your answer of 80.14100 is correct.

Try this one.

Subtract: 4.0813
-4.0212

(a) 4.0601 Turn to page 18

(b) 0.0601 Turn to page 16

(c) .00601 Turn to page 25

Now wait a minute!

In order for you to have missed this problem, you must have been in too much of a hurry.

Return to page 13 and study the example carefully.

Then work the problem again.

Good! Your answer of 80.141 is correct.

Try this one.

Subtract: 4.0813
-4.0212

(a) 4.0601 Turn to page 18

(b) 0.0601 Turn to page 16

(c) .00601 Turn to page 25

Now wait a minute!

In order for you to have missed this problem you must have been in too much of a hurry.

Return to page 13 and study the example carefully.

Then, work the problem again.

Incorrect! Let's examine the problem.

The problem was to subtract 173.11 from 284.93.

The problem looks like this:
$$\begin{array}{r} 284.93 \\ -173.11 \\ \hline 111.82 \end{array}$$

Study this example with emphasis on where the decimal point lies.

Question:

What is the difference between:
$$\begin{array}{r} 87.39201 \\ -\ 7.25101 \\ \hline \end{array}$$

(a) 80.141 Turn to page 22

(b) 8.1410 Turn to page 25

(c) 80.14100 Turn to page 20

Incorrect!

Tell your teacher that you are having trouble subtracting decimals and need help.

Then return to page 5 of this Unit.

Very good!

Try this subtraction problem:

$$\begin{array}{r} 53.414 \\ -\ 8.438 \\ \hline \end{array}$$

(a) 44.976 Turn to page 42

(b) 45.086 Turn to page 27

(c) Can't be done since .438 is larger than .414 Turn to page 36

Not quite!

The subtraction of decimals is the same as subtraction of whole numbers. Note also that like addition, the decimal points must be located above one another for subtraction.

Work through the examples below:

(a)	(b)	(c)
.42308	63.245	3.1572
-.36127	- .756	-2.4383
.06181	62.489	0.7189

Now you try this one.

Subtract: 34.14
- .23

(a) 34.91 Turn to page 41

(b) 33.91 Turn to page 38

(c) 3.391 Turn to page 43

Very good! Your answer is correct.

Try this one.

Add:
```
   4.002
  18.941
 970.387
  20.205
```

(a) 9113.535 Turn to page 32

(b) 1003.535 Turn to page 30

(c) 1013.535 Turn to page 26

Incorrect!

The important thing to remember when adding decimals is that once the numbers are arranged in vertical columns with the decimal points located under one another: The Columns are then added just like they were whole numbers.

Look at the following examples:

(a)	(b)	(c)
82.654	65.48	49.001
+18.439	+ .03	.924
101.093	65.51	+36.139
		86.064

Now try this one.

Add:
4.16
23.32
5.09
.72
2.12

(a) 35.41 Turn to page 28

(b) 34.41 Turn to page 35

(c) 34.141 Turn to page 37

Incorrect!

The numbers were arranged in the proper order for you to add. All you had to do was correctly add the numbers as you would a column of whole numbers.

Return to page 28 and add the numbers again.

You're not paying attention!

Return to page 33 and work through the examples again. Then do the problem at the bottom of page 33.

Incorrect!

The numbers were arranged in the proper order for you to add. All you had to do was correctly add the numbers as you would a column of whole numbers.

Return to page 28 and add the numbers again.

Incorrect!

The important thing to remember when adding decimals is that once the numbers are arranged in vertical columns with the decimal points located under one another: The columns are then added just like they were whole numbers.

Look at the following examples:

(a) 82.654 + 18.439 = 101.093

(b) 65.48 + .03 = 65.51

(c) 49.001 + .924 + 36.139 = 86.064

Now try this one.

Add: 4.16 + 23.32 + 5.09 + .72 + 2.12

(a) 35.41 Turn to page 28

(b) 34.41 Turn to page 35

(c) 34.141 Turn to page 37

You almost had it!

Your mistake was in addition. Return to page 37

and add the numbers again.

Oops! Almost had it.

You made an error in your addition. Return to page 33 and add the numbers again.

Incorrect!

The subtraction of decimals is like that of whole numbers. The only difference is that we must arrange the numbers such that the decimals are lined up. We can "borrow" across a decimal point the same as with whole numbers.

Carefully work through the examples below:

(a) $\begin{array}{r} .42308 \\ -.36127 \\ \hline .06181 \end{array}$ (b) $\begin{array}{r} 63.245 \\ -\ .756 \\ \hline 62.489 \end{array}$ (c) $\begin{array}{r} 3.1572 \\ -2.4383 \\ \hline 0.7189 \end{array}$

Now you try this one.

Subtract: $\begin{array}{r} 34.14 \\ -\ .23 \\ \hline \end{array}$

(a) 34.91 Turn to page 41

(b) 33.91 Turn to page 38

(c) 3.391 Turn to page 43

Whoa!

When adding decimal numbers the vertical columns are added one at a time. They are added like whole numbers and the process of "carrying" is the same.

For example, adding the whole numbers 25 and 36, we get:

$$\begin{array}{r} 36 \\ +25 \\ \hline 61 \end{array}$$

When adding decimal numbers the same process is used:

$$\begin{array}{r} 3.6 \\ +2.5 \\ \hline 6.1 \end{array}$$

The addition process is identical once the decimal points are arranged in a column.

Now you try this one.

What is the sum of:

$$\begin{array}{r} 4.03065 \\ +\ .18438 \\ \hline \end{array}$$

(a) 4.21403 Turn to page 34

(b) 42.1403 Turn to page 31

(c) 4.21503 Turn to page 28

Good, 33.91 is the correct answer.

Question:

What is the difference:

$$\begin{array}{r} 410.0023 \\ -\ .6435 \\ \hline \end{array}$$

(a) 419.3588 Turn to page 40

(b) 409.3688 Turn to page 44

(c) 409.3588 Turn to page 42

Incorrect!

You have made an error in subtraction. Return to page 43 and rework the problem.

Incorrect!

You made an error in your subtraction. Return to page 38 and work the problem again.

Oops!

You had better go back to page 36 and check your subtraction.

Correct!

The problems you have worked so far demonstrate the first rule for adding or subtracting decimals.

This rule is: Arrange the numbers in such a way that the decimal points and numerals are in straight vertical columns.

For example, when adding 7, .414, 31.07, .2 we write:

```
  7.
  .414
 31.07
+  .2
 38.684
```

Now you try one.

Add: .607, 3.12, 4, .4

(a) 8.127 Turn to page 49

(b) 8.19 Turn to page 51

(c) 11.727 Turn to page 46

No!

You are having trouble placing the decimal point after subtracting. The only thing to remember is to place the decimal point in the answer below the other two decimal points.

Look at the examples below:

(a)
$$\begin{array}{r} 7.46 \\ -\ .87 \\ \hline 6.59 \end{array}$$

(b)
$$\begin{array}{r} 171.003 \\ -\ 2.104 \\ \hline 168.899 \end{array}$$

Question:

$$\begin{array}{r} 122.70 \\ -\ 88.79 \\ \hline ? \end{array}$$

(a) 33.91 Turn to page 38

(b) 123.91 Turn to page 45

(c) 33.81 Turn to page 39

Incorrect!

You made an error in your subtraction. Return to page 38 and work the problem again.

Incorrect!

You have made an error in subtraction. Return to page 43 and rework the problem.

Incorrect!

When adding decimals you must first write the numbers in straight vertical columns.

Perhaps this little trick will help you. Sometimes to make our addition easier we annex (add) zeros to fill out the columns.

Carefully look at these examples:

(a)	2.41		2.410	(b)	41.061		41.061
	6.6		6.600		1.9		1.900
	4.	becomes	4.000		.13	becomes	.130
	.031		.031		7.		7.000
			13.041				50.091

You try this one.

Add: .873, 20, .24, 1.408, .6

(a) 5.121 Turn to page 53

(b) 23.121 Turn to page 60

(c) I don't understand annexing zeros Turn to page 58

That's better.

Try this one.

The sum of .06, .008, .07, 5.9 is:

(a) 5.1038 Turn to page 54

(b) 6.11 Turn to page 57

(c) 6.038 Turn to page 60

Correct!

Try this one.

What is the sum of 6.06, 3, .071, 4, .2 ?

(a) 7.031 Turn to page 52

(b) 13.331 Turn to page 47

(c) 13.277 Turn to page 58

Very good! Your answer is correct.

Sometimes it makes our addition of columns easier if we annex (add) zeros to fill out the columns.

Look at these two examples:

(a)	2.41		2.410	(b)	41.061		41.061
	6.6	becomes	6.600		1.9	becomes	1.900
	4.		4.000		.13		.130
	.031		.031		7.		7.000
			13.041				50.091

You try this one.

Add: .873, 20, .24, 1.408, .6

(a) 23.085 Turn to page 56

(b) 23.121 Turn to page 60

(c) 5.121 Turn to page 53

Incorrect!

You made a mistake because you did not line up the decimals and annex zeros for place holders. It is important that you are careful in doing this.

Let's look at the problem.

Adding .6, 2.148, 8, .07 we get:

```
 .600
2.148
8.000
 .070
```

The sum is now _____?

(a) 10.718 Turn to page 55

(b) 1.0818 Turn to page 61

(c) 10.818 Turn to page 47

Incorrect!

When adding decimals you must first write the numbers in straight vertical columns.

Perhaps this little trick will help you. Sometimes to make our addition easier we annex (add) zeros to fill out the columns.

Carefully look at these examples:

(a) 2.41 6.6 4. .031	becomes	2.410 6.600 4.000 .031 13.041	(b) 41.061 1.9 .13 7.	becomes	41.061 1.900 .130 7.000 50.091

You try this one.

Add: .873, 20, .24, 1.408, .6

(a) 5.121 Turn to page 53

(b) 23.121 Turn to page 60

(c) I don't understand annexing zeros Turn to page 58

Incorrect!

You are still having trouble setting up the problem and annexing zeros to help keep your columns straight.

Return to page 51 and study the examples again.

Incorrect! Let's take another look at the problem.

We wanted to add .873, 20, .24, 1.408, .6. Writing these numbers in column form:

```
  .873
20.
  .24
 1.408
  .6
```

Then we annex the zeros to get:

```
  .873
20.000
  .240
 1.408
  .600
23.121
```

You try one.

What is the sum of .6, 2.148, 8, .07 ?

(a) 10.818 Turn to page 47

(b) 11.448 Turn to page 50

(c) I'm not quite sure about annexing zeros Turn to page 58

Oh, oh! You made a serious mistake.

When you added you said:

$$\begin{array}{r} .060 \\ .008 \\ .070 \\ 5.900 \\ \hline \end{array}$$

was: 5.1038 which is incorrect.

Remember that the columns are to be added as if the decimal didn't exist, then the decimal is placed directly below the others. The one should have been "carried" just like you would have done with whole numbers.

Choose the answer most appropriate for your situation.

(a) I understand but was just careless
Turn to page 62

(b) I feel I need more work on adding decimals
Turn to page 63

Incorrect!

You are having trouble adding decimals. Remember that the columns are to be added as if the decimal didn't exist, then the decimal is placed directly below the others. The one should have been "carried" just like you would have done with whole numbers.

Choose the answer most appropriate for your situation.

(a) I understand but was just careless
Turn to page 62

(b) I feel I need more work on adding decimals
Turn to page 63

Incorrect! Let's take another look at the problem.

We wanted to add .873, 20, .24, 1.408, .6. Writing these numbers in column form:

```
  .873
20.
  .24
1.408
  .6
```

Then we annex the zeros to get:

```
  .873
20.000
  .240
 1.408
  .600
23.121
```

You try one.

What is the sum of .6, 2.148, 8, .07 ?

(a) 10.818 Turn to page 47

(b) 11.448 Turn to page 50

(c) I'm not quite sure about annexing zeros Turn to page 58

Now wait just a minute!

In order to get 6.11 as the sum you must have been really careless or just guessing. Hurrying through these problems isn't going to do you any good.

Return to page 47 and be more careful.

Annexing zeros is a fairly simple idea. The idea is that we can put zeros on the end of a decimal number without changing its value.

For example, we can say: 4. = 4.0 = 4.00 = 4.000

1.6 = 1.60 = 1.600 = 1.6000

.46 = .460 = .4600 = .46000

Note that we only annex zeros to the RIGHT-HAND SIDE of the numerals on the RIGHT-HAND SIDE of the decimal.

Now let's see if you can work an addition problem using this idea.

Add: 21.063, 2.8, .76, 8

(a) 32.623 Turn to page 48

(b) 31.219 Turn to page 52

(c) I don't see how they can be equal after annexing zeros Turn to page 59

Sometimes this idea can be difficult to understand. You will find a more detailed explanation on page 22 of Unit 8 (Concepts of Decimals and Fractions).

When you understand this concept, return to page 42 of this Unit.

Good, your answer is correct!

The first rule for addition is also the first rule for subtraction. The rule states:

> Arrange the numbers in such a way that the decimal points and numerals are in straight vertical columns.

For example, subtracting 8.63 from 94.54 we write:

$$\begin{array}{r} 94.54 \\ -\ 8.63 \\ \hline 85.91 \end{array}$$

Note that like addition, we must have the decimal points directly below one another through to the answer.

Question:

The difference between 4.607 and .13 is _____.

(a) 4.477 Turn to page 71

(b) 4.594 Turn to page 69

(c) 4.737 Turn to page 66

Incorrect!

You are having trouble adding decimals. Remember that the columns are to be added as if the decimal didn't exist, then the decimal is placed directly below the others. The one should have been "carried" just like you would have done with whole numbers.

Choose the answer most appropriate for your situation.

(a) I understand but was just careless
Turn to page 62

(b) I feel I need more work on adding decimals
Turn to page 63

Okay. Let's start again but be more careful this time.

Remember the first rule:

Arrange the numbers in such a way that the decimal points and numerals are in straight vertical columns.

Work this problem.

Add: .607, 3.12, 4, .4

(a) 8.127 Turn to page 49

(b) 8.19 Turn to page 51

(c) 11.727 Turn to page 46

Here is some more work on adding decimals.

Cover the answers below the problems and work them carefully. After working them, turn to page 42 of this Unit and continue from there.

(a)
$$\begin{array}{r} .09 \\ .06 \\ +.04 \\ \hline .19 \end{array}$$

(b)
$$\begin{array}{r} 4.180 \\ .816 \\ 5.000 \\ +\ .060 \\ \hline 10.056 \end{array}$$

(c)
$$\begin{array}{r} 3.0000 \\ .0050 \\ 1.1100 \\ 6.8463 \\ +\ .1400 \\ \hline 11.1013 \end{array}$$

(d)
$$\begin{array}{r} .041 \\ .892 \\ 10.934 \\ .701 \\ +\ .624 \\ \hline 13.192 \end{array}$$

(e)
$$\begin{array}{r} 5.0003 \\ .0097 \\ .0006 \\ .4000 \\ +3.0000 \\ \hline 8.4106 \end{array}$$

Correct! That's better.

Let's see what you can do with this next one.

Subtract 1.98 form 52.074.

(a) 50.094 Turn to page 71

(b) 51.876 Turn to page 73

(c) 50.076 Turn to page 68

No, No, No!

You still aren't lining up the decimal points before subtracting.

Go to page 63 of this Unit and continue working from there.

Whoa! The words "difference between" mean subtract ---not add!

Just a careless mistake, huh? Okay, return to page 60 and work it correctly this time.

Incorrect!

You should be able to successfully subtract one integer from another. Well, subtracting one decimal number from another involves the same process. The only difference is that you must line up the decimal points.

Try this one.

Subtract .25 from 25.441.

(a) 25.191 Turn to page 64

(b) .441 Turn to page 70

(c) 25.416 Turn to page 65

Now wait a minute!

First you get a tough one correct, then you turn around and miss an easier one.

Remember to line up the decimal points before proceeding with the subtraction process. For example, if you were subtracting 4.06 form 73.716 you would write:

$$\begin{array}{r} 73.716 \\ -\ 4.06 \\ \hline 69.656 \end{array}$$

Now try this one.

Subtract 21.336 from 40.247

(a) 28.911 Turn to page 67

(b) 18.911 Turn to page 64

(c) 19.911 Turn to page 72

Incorrect!

Remember that, like addition, the first thing you want to do is set up the problem correctly. From your answer I can tell that you didn't.

Let's take a look at the proper way to set it up. To find the difference of 4.607 and .13 we write:

$$\begin{array}{r} 4.607 \\ -\ .13 \\ \hline \end{array}$$

Making sure that the decimal points are directly below one another, carrying out the subtraction process we get:

$$\begin{array}{r} 4.607 \\ -\ .13 \\ \hline 4.477 \end{array}$$

Now you try one.

Subtract .6285 from 3.0047

(a) 2.3862 Turn to page 72

(b) 2.4662 Turn to page 67

(c) 2.3762 Turn to page 64

No, no, no!

You still aren't lining up the decimal points before subtracting.

Go to page 63 of this Unit and continue working from there.

Correct!

Sometimes annexing zeros to fill out the columns is necessary in the subtraction of decimal numbers.

Look at these examples:

(a) $\begin{array}{r} .093 \\ -.07156 \end{array}$ becomes $\begin{array}{r} .09300 \\ -.07156 \\ \hline .02144 \end{array}$ (b) $\begin{array}{r} 1.9 \\ -\ .1245 \end{array}$ becomes $\begin{array}{r} 1.9000 \\ -\ .1245 \\ \hline 1.7755 \end{array}$

Question:

Subtract .616 from 41.

(a) .575 Turn to page 74

(b) -.206 Turn to page 77

(c) 40.384 Turn to page 83

Incorrect!

You should be able to successfully subtract one integer from another. Well, subtracting one decimal number from another involves the same process. The only difference is that you must line up the decimal points.

Try this one.

Subtract .25 from 25.441

(a) 25.191 Turn to page 64

(b) .441 Turn to page 70

(c) 25.416 Turn to page 65

Now wait a minute!

First you get a tough one correct, then you turn around and miss an easier one.

Remember to line up the decimal points before proceeding with the subtraction process. For example, if you were subtracting 4.06 from 73.716 you would write:

$$\begin{array}{r} 73.716 \\ -\ 4.06 \\ \hline 69.656 \end{array}$$

Now try this one.

Subtract 21.336 from 40.247

(a) 28.911 Turn to page 67

(b) 18.911 Turn to page 64

(c) 19.911 Turn to page 72

Oops! You got the numbers turned around.

The problem was to subtract .616 from 41. What did you do?

Let's take a look at the proper way of doing this problem.

Since 41 is an integer we write:

$$\begin{array}{r} 41.000 \\ -\ .616 \\ \hline 40.384 \end{array}$$

Notice that we annex zeros to the integer 41 so that what we are subtracting becomes clear.

Question:

What is the difference between .375 and 1 ?

(a) .374 Turn to page 85

(b) .625 Turn to page 80

(c) .275 Turn to page 79

Although it is true that .0465 is larger than .03, the problem states 1.03. The decimal number 1.03 is larger then .0465 so we can subtract.

With this in mind return to page 80 and carry out the subtraction.

Very good! You have shown that you understand the ideas of this Unit. Let's review what we have done:

1. You have learned how to correctly add decimal numbers to one another or to integers.

2. You have learned how to correctly subtract any two decimal numbers from each other or from an integer.

3. You have learned that the first rule for addition or subtraction of decimals is to arrange the numbers such that the decimal points lie directly below one another.

4. You have learned that sometimes it is necessary to annex zeros to the numbers to make the addition or subtraction of decimals easier.

Now you should be ready for a test over this Unit. Tell your teacher that you have finished.

Impossible!

There is no way in this world that we can subtract a smaller number like .616 from the whole number 41 and get a negative number.

Let's take a look at the proper way of doing this problem.

Since 41 is an integer, we write:

$$\begin{array}{r} 41.000 \\ -\ .616 \\ \hline 40.384 \end{array}$$

Notice that we annex zeros to the integer 41 so that what we are subtracting becomes clear.

Question:

What is the difference between .375 and 1 ?

(a) .374 Turn to page 85

(b) .625 Turn to page 80

(c) .275 Turn to page 79

Your answer is wrong.

Remember the first rule of subtracting decimals is to arrange the numbers such that the decimal points are directly below one another. If you would follow this procedure, you won't make errors like you did on this problem.

Turn to page 71 of this Unit and note the position of the decimals. Then work the problem and continue from there.

Incorrect!

The problem was to find the difference between 1 and .375. The integer 1 can be written as 1.000. Then the decimal points are lined up and we have:

$$\begin{array}{r} 1.000 \\ -\ .375 \\ \hline \end{array}$$

The difference is now _____.

(a) 1.625 Turn to page 27

(b) 6.25 Turn to page 36

(c) .625 Turn to page 80

Correct! That's more like it.

Now try this one.

Subtract .0465 from 1.03

(a) .9835 Turn to page 83

(b) .0362 Turn to page 78

(c) Can't be done as .0465 is larger than .03
Turn to page 75

Oops!

Let's take another look. The difference of 8.417 and 6 would have been easy to find if you would have properly lined up the decimals. The problem becomes:

$$\begin{array}{r} 8.417 \\ -6.000 \\ \hline 2.417 \end{array}$$

I'll give you another chance.

Question:

What is the difference of 5.9 and 6.314?

(a) 4.14 Turn to page 82

(b) 1.414 Turn to page 86

(c) .414 Turn to page 84

Oh, no!

What happened? All of a sudden you make a mistake by misplacing the decimal.

Turn to page 60 and read the material on that page carefully, then work the problem at the bottom of the page and continue from there.

Good! Your last answer was correct.

Try this one.

What is the difference between 8.417 and 6?

(a) 2.417 Turn to page 76

(b) 8.411 Turn to page 81

(c) 7.817 Turn to page 88

Okay. That's better.

See what you can do with this one.

Find the difference of 4 and 9.118

(a) 9.114 Turn to page 87

(b) 5.118 Turn to page 76

(c) 8.718 Turn to page 89

Incorrect!

The problem was to find the difference between 1 and .375. The integer 1 can be written as 1.000. Then the decimal points are lined up and we have:

$$\begin{array}{r} 1.000 \\ -\ .375 \\ \hline \end{array}$$

The difference is now _____.

(a) 1.625 Turn to page 27

(b) 6.25 Turn to page 36

(c) .625 Turn to page 80

Hum-m-m!

I'm afraid your subtraction was carelessly done.

Return to page 88 and subtract those two numbers again.

Your answer is incorrect.

You were to find the difference of 4 and 9.118.

Since 4 is an integer we write it as 4.000. Thus,

our subtraction becomes:

$$\begin{array}{r} 9.118 \\ -4.000 \\ \hline 5.118 \end{array}$$

Now you work this one.

The difference of .375 and 1 is _____.

(a) .275 Turn to page 79

(b) .625 Turn to page 80

(c) .374 Turn to page 85

Oops! Let's take another look.

The difference of 8.417 and 6 would have been easy to find if you would have properly lined up the decimals. The problem becomes:

$$\begin{array}{r} 8.417 \\ -6.000 \\ \hline 2.417 \end{array}$$

I'll give you another chance.

What is the difference of 5.9 and 6.314 ?

(a) 4.14 Turn to page 82

(b) 1.414 Turn to page 86

(c) .414 Turn to page 84

Your answer is incorrect.

You were to find the difference of 4 and 9.118.

Since 4 is an integer we write it as 4.000. Thus,

our subtraction becomes:

$$\begin{array}{r} 9.118 \\ -4.000 \\ \hline 5.118 \end{array}$$

Now you work this one.

The difference of .375 and 1 is _____.

(a) .275 Turn to page 79

(b) .625 Turn to page 80

(c) .374 Turn to page 85

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TITLE

Occupational Mathematics - ADDITION AND SUBTRACTION OF DECIMALS

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RETRIEVAL TERMS

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Addition and subtraction of decimals

IDENTIFIERS

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ABSTRACT

One book of a 21-book series of programmed instruction materials designed to help pupils acquire mathematics capabilities most useful in sub-professional level occupations. Other programmed books in the series are:

Symbols
Representing Numbers by Letters
Equivalent Forms
Fraction and Ratio
Addition of Fractions
Subtraction of Fractions
Multiplication of Fractions
Division of Fractions
Concepts of Decimals and Fractions
Multiplication of Decimals
Division of Decimals
Conversion of Fractions into Decimals
Equivalent Forms of A = BC
Solutions of A = BC
Percentage
Commutative Law
Reciprocals
Scientific Notation
Proportions
Concepts of Number Bases

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CAI MATHEMATICS

TEST QUESTIONS

UNIT 9 - ADDITION AND SUBTRACTION OF DECIMALS

1. In addition of decimals, the decimal point must be lined up before adding.

   a) yes

   b) no

2. Subtract 127.84
   -16.02

   a) 111.82

   b) 11.82

   c) 1182

3. Add 3.12
   1.23
   .04

   a) 4.40

   b) .439

   c) 4.39

4. Subtract 8.954
   -.942

   a) 8.012

   b) 8.12

   c) .8012

5. Add 164.09
   78.51
   4.21
   .31

   a) 246.112

   b) 247.12

   c) 246.12

Unit 9 (continued)

6. Subtract .376
-.255

a) 1.21

b) .121

c) .0121

7. Add .45
.12
.41

a) .98

b) 9.8

c) 98.0

8. Subtract 284.93
-173.11

8.

a) 11.192

b) 11.182

c) 111.82

9. Add 23.15
60.01
15.02
1.41

a) 9.969

b) 99.59

c) 98.6

10. Subtract 85.29101
-3.03256

a) 8.225845

b) 82.25845

c) 82.26845

11. Add 3.05 and 32.00

a) 62.05

b) 32.305

c) 35.05

12. There is no reason to aline decimals in subtraction of decimals

a) true

b) false

13. Add .616 and 41.0

a) 41.616

b) 1.016

c) 4.1616

14. Subtract .356 from 15.000

a) 1.4640

b) 12.440

c) 14.644

15. Add 20 and .035 and 2.25

a) 22.285

b) 202.060

c) 22.060

16. 1.8 is the same as 1.8000
-.0562 -.0562

a) yes

b) no

17. Add 4.0356 and 15.2520

a) 19.2876

b) 55.2876

c) 1.92876

18. Subtract .25 from 25.441

a) 25.191

b) .441

c) 25.416

19. Add 413.2
42.12
15.06

a) 98.50

b) 470.38

c) 985.0

20. What is the difference between .425 and 1

a) .425

b) .575

c) .275

Unit 9 (continued)

21. Subtract 538
-16.3

a) 521.7

b) 475.0

c) 47.50

22. Add 60.15
3.620
25.31

a) 121.66

b) 12.166

c) 89.080

23. Subtract .48 from 36

a) can't be done

b) 35.52

c) .12

24. What is the sum of .01 and .772?

a) 1.722

b) .782

c) .872

25. What is the difference between .096 and .0096?

a) .0864

b) .0000

c) .001

ANSWER SHEET

UNIT 9 - ADDITION AND SUBTRACTION OF DECIMALS

1. a
2. a
3. c
4. a
5. b
6. b
7. a
8. c
9. b
10. b
11. c
12. b
13. a
14. c
15. a
16. a
17. a
18. a
19. b
20. b
21. a
22. c
23. b
24. b
25. a

To the instructor: The above problems are related to the objectives as follows:

OBJECTIVE

1 : 1,3.5,7.9,11,13.15,17,19,22.24

2 : 2,4,6,8,10.12,14,16,18.20,21,23,25